FIG. 1

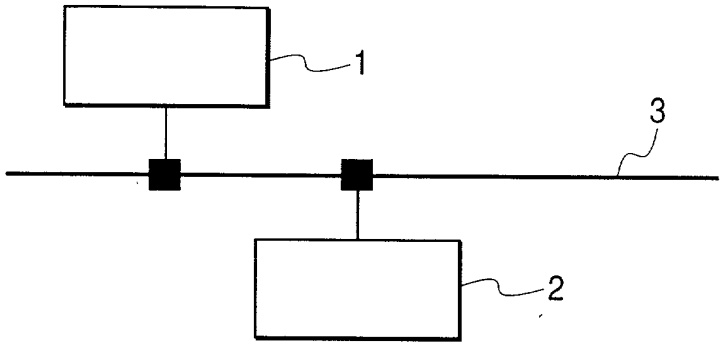


FIG. 2

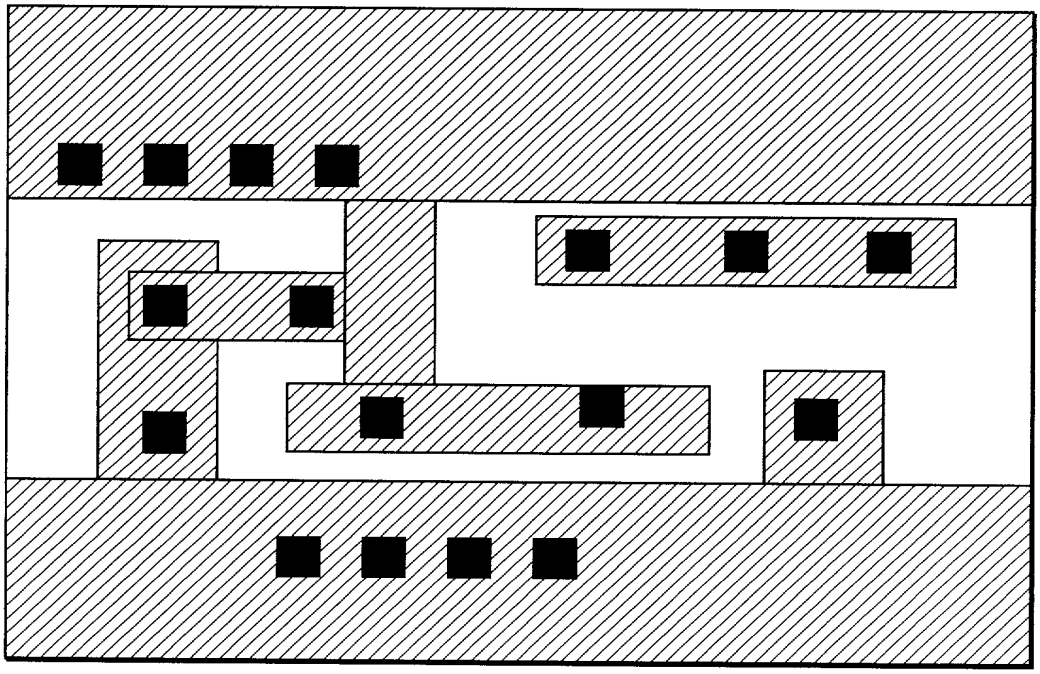


FIG. 3

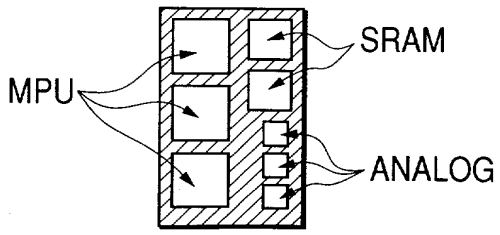


FIG. 4(a)

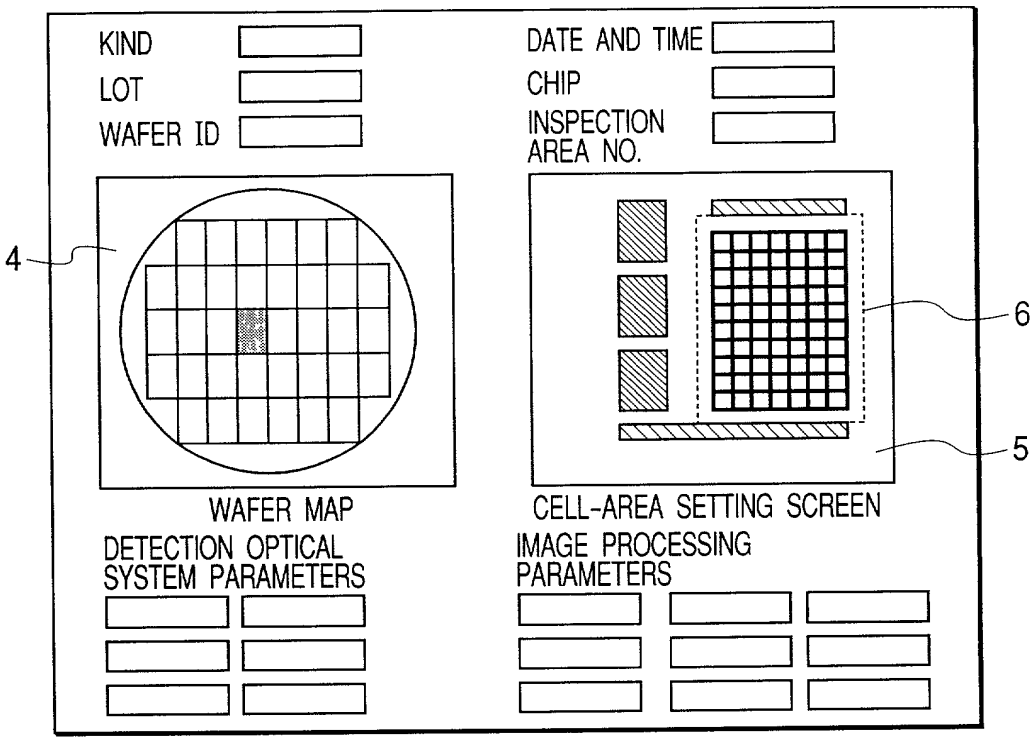

KIND
LOT
WAFER ID
DATE AND TIME
CHIP
INSPECTION AREA NO.
4
6
5
WAFER MAP
CELL-AREA SETTING SCREEN
DETECTION OPTICAL SYSTEM PARAMETERS
IMAGE PROCESSING PARAMETERS

FIG. 4(b)

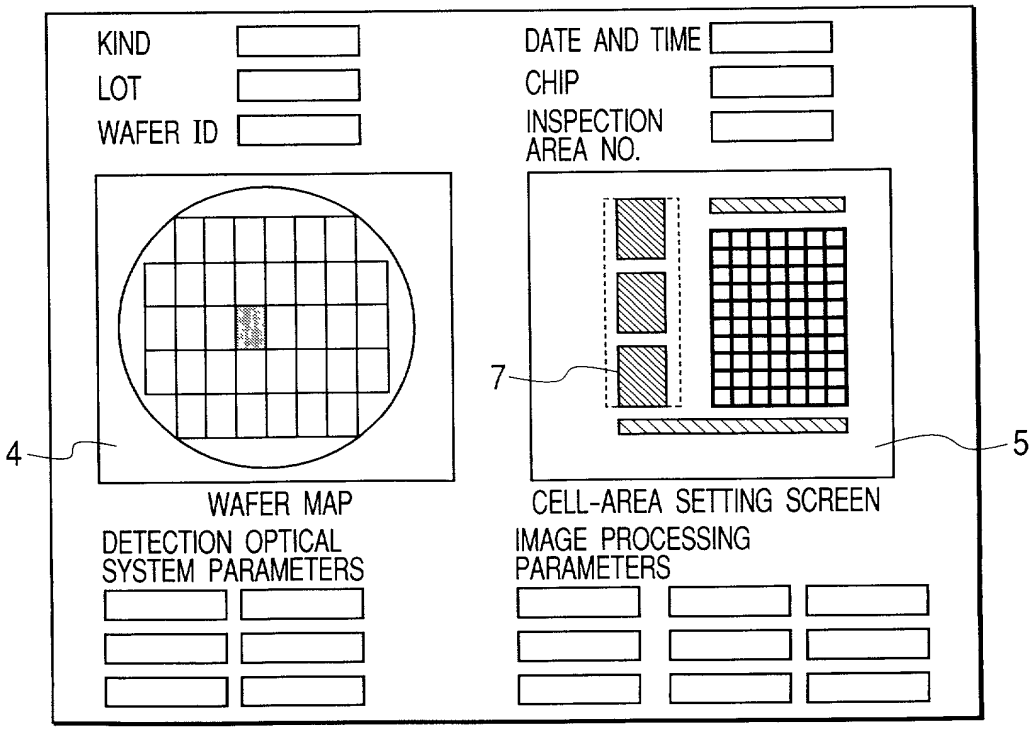

KIND
LOT
WAFER ID
DATE AND TIME
CHIP
INSPECTION AREA NO.
7
4
5
WAFER MAP
CELL-AREA SETTING SCREEN
DETECTION OPTICAL SYSTEM PARAMETERS
IMAGE PROCESSING PARAMETERS

FIG. 5

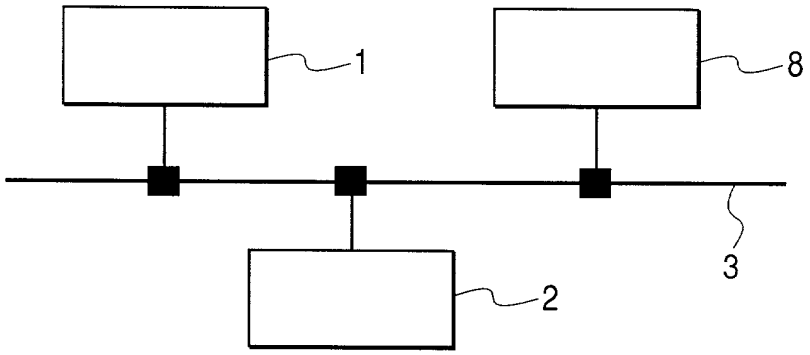


FIG. 6(a)

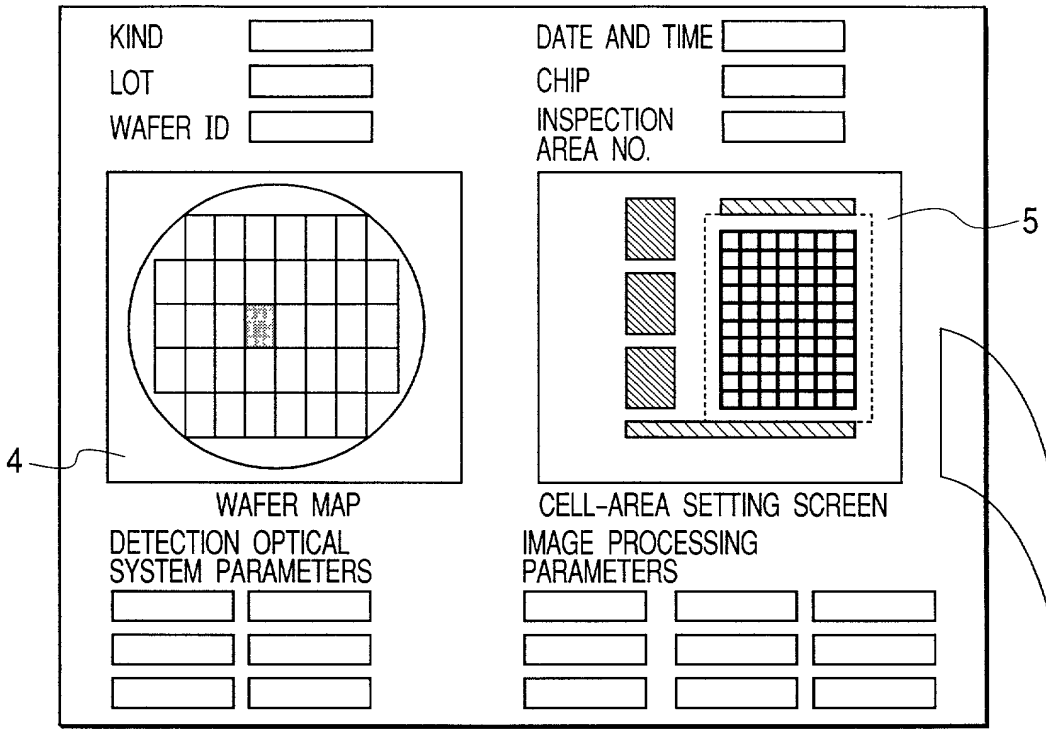

KIND
LOT
WAFER ID
DATE AND TIME
CHIP
INSPECTION AREA NO.
4
5
WAFER MAP
CELL-AREA SETTING SCREEN
DETECTION OPTICAL SYSTEM PARAMETERS
IMAGE PROCESSING PARAMETERS

FIG. 6(b)

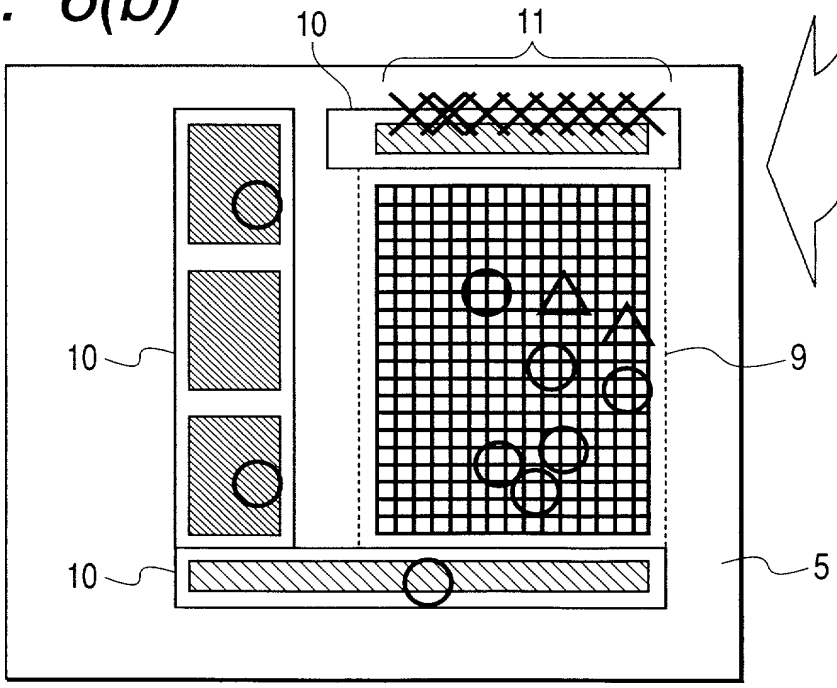

10
11
10
9
10
5

FIG. 7

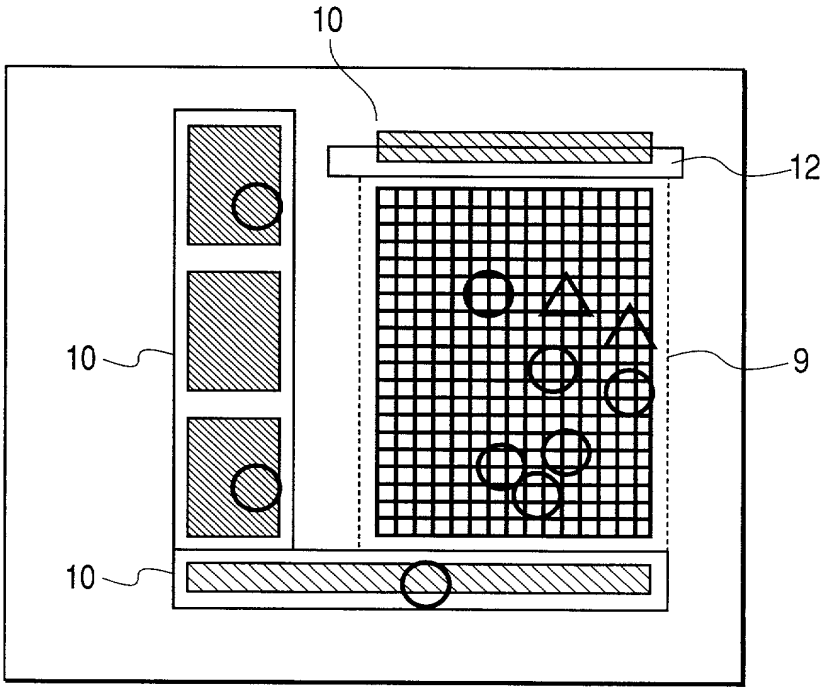


FIG. 8(a)

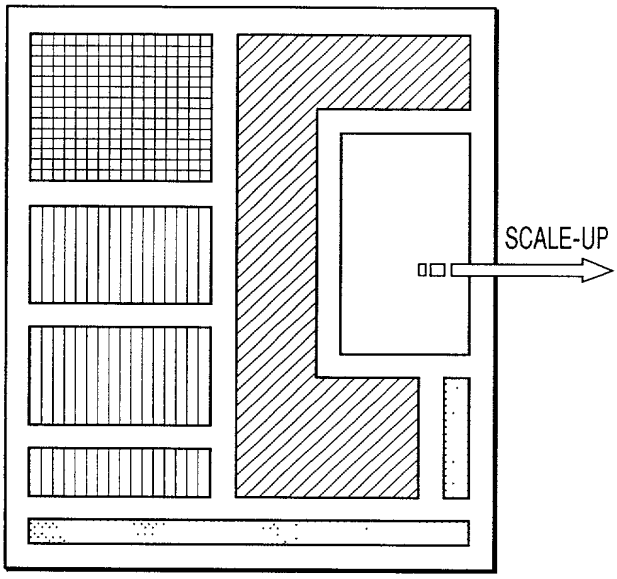


FIG. 8(b)

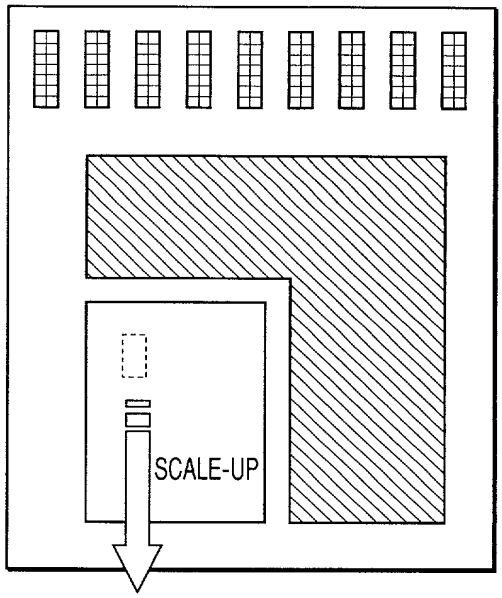


FIG. 8(c)

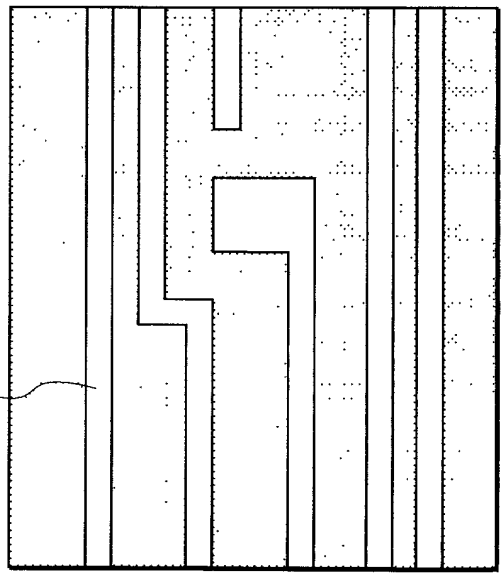


FIG. 9

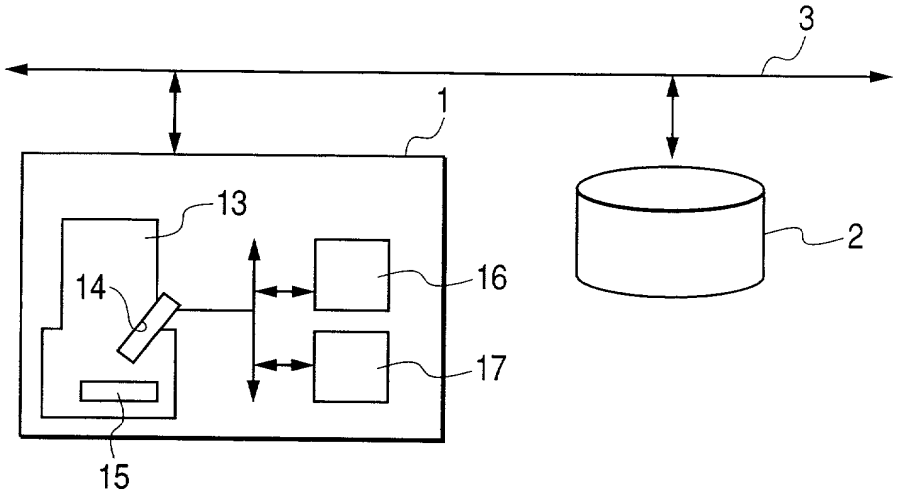

3
1
13
14
16
17
15
2

FIG. 10

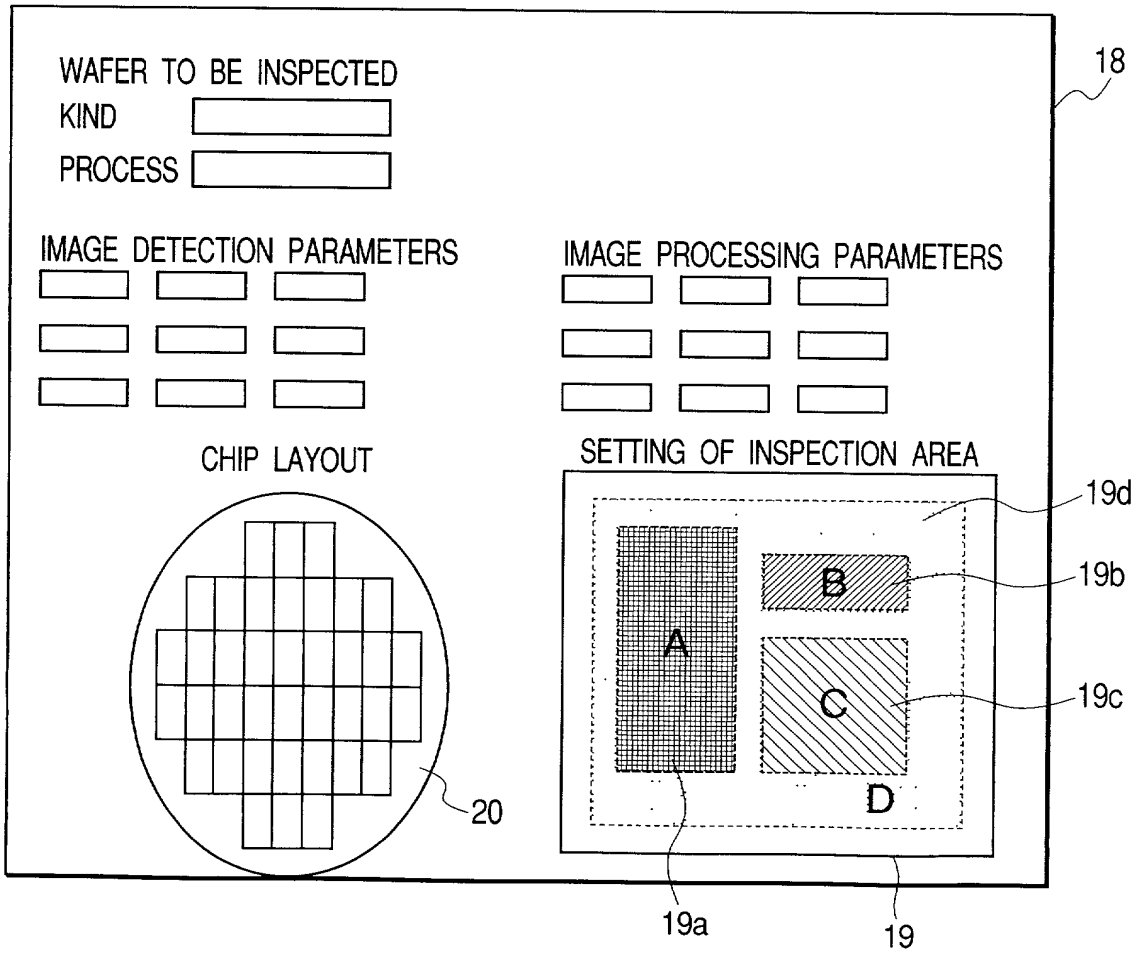

18
WAFER TO BE INSPECTED
KIND
PROCESS
IMAGE DETECTION PARAMETERS
IMAGE PROCESSING PARAMETERS
CHIP LAYOUT
SETTING OF INSPECTION AREA
19d
19b
19c
A
B
C
D
20
19a
19

FIG. 11(a)

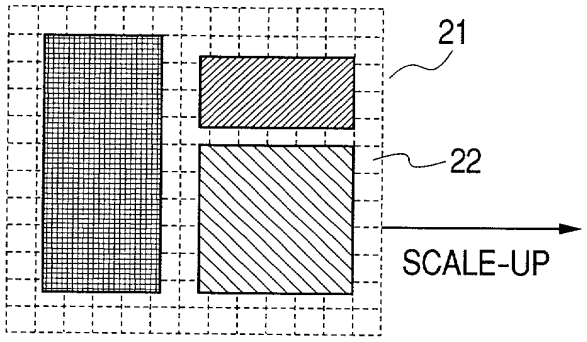


FIG. 11(b)

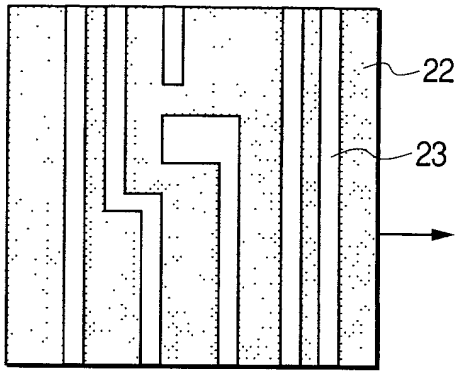
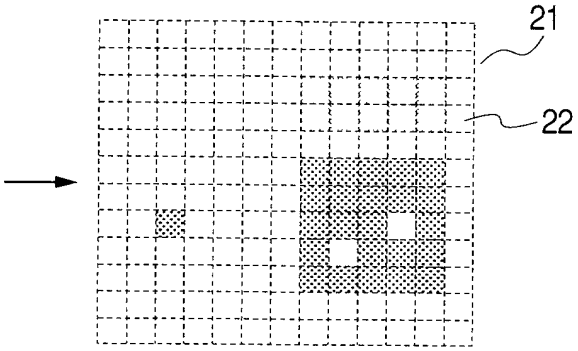


FIG. 11(c)



DENSITY OF WIRING IS LOW
DENSITY OF WIRING IS MEDIUM
DENSITY OF WIRING IS HIGH

FIG. 12(a)

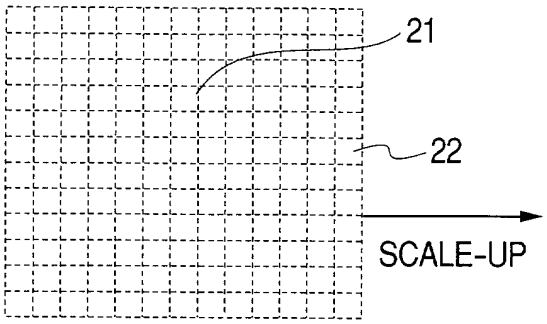


FIG. 12(b)

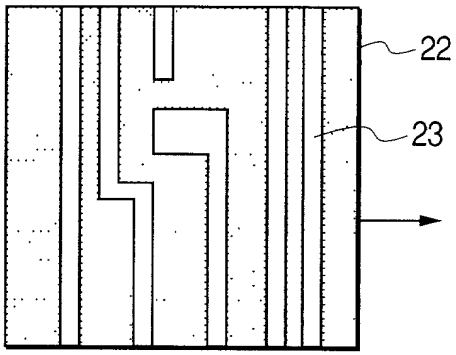
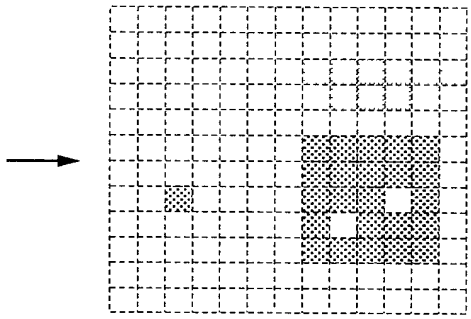


FIG. 12(c)



DENSITY OF WIRING IS LOW
DENSITY OF WIRING IS MEDIUM
DENSITY OF WIRING IS HIGH

FIG. 12(d)

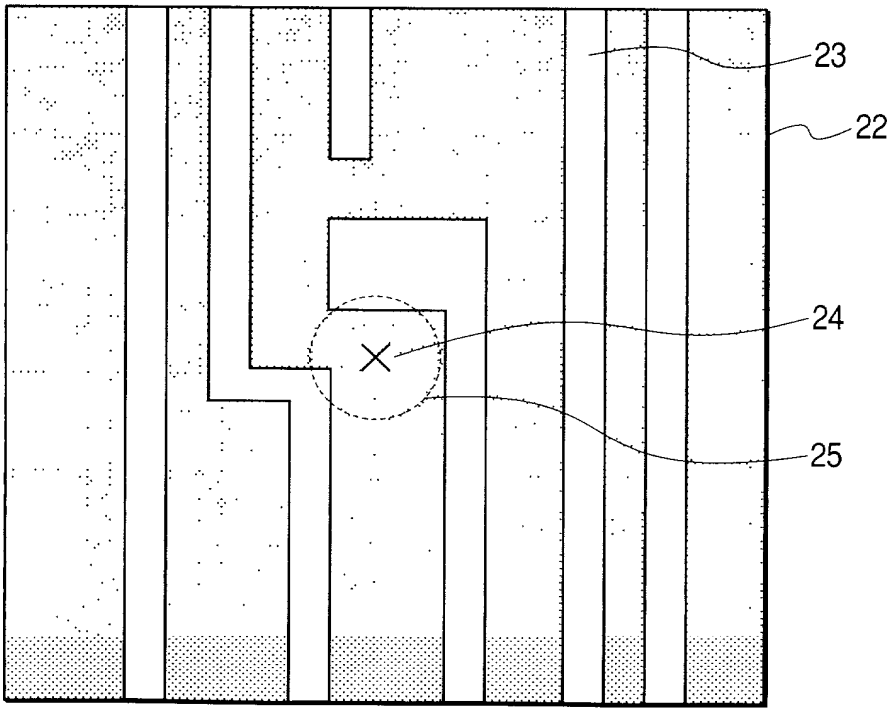


FIG. 13

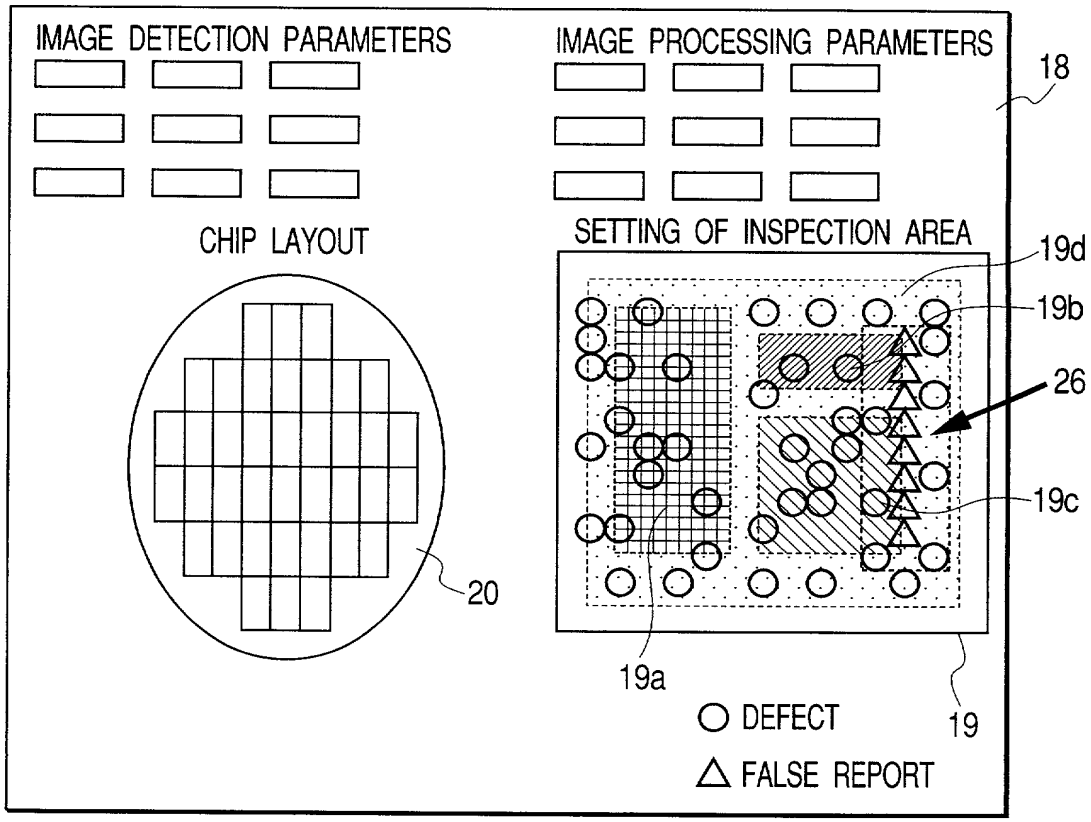


IMAGE DETECTION PARAMETERS
IMAGE PROCESSING PARAMETERS
18
CHIP LAYOUT
SETTING OF INSPECTION AREA
19d
19b
26
19c
20
19a
19
DEFECT
FALSE REPORT

FIG. 14

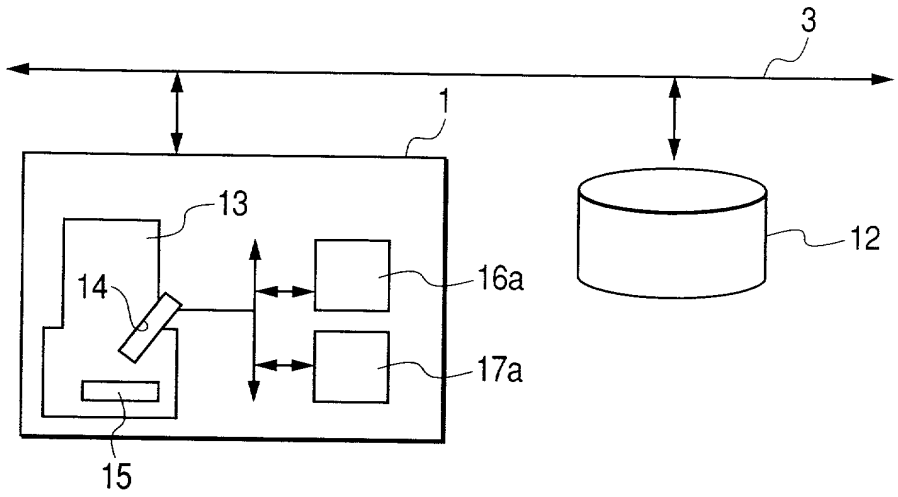

3
1
13
14
16a
17a
12
15

FIG. 15

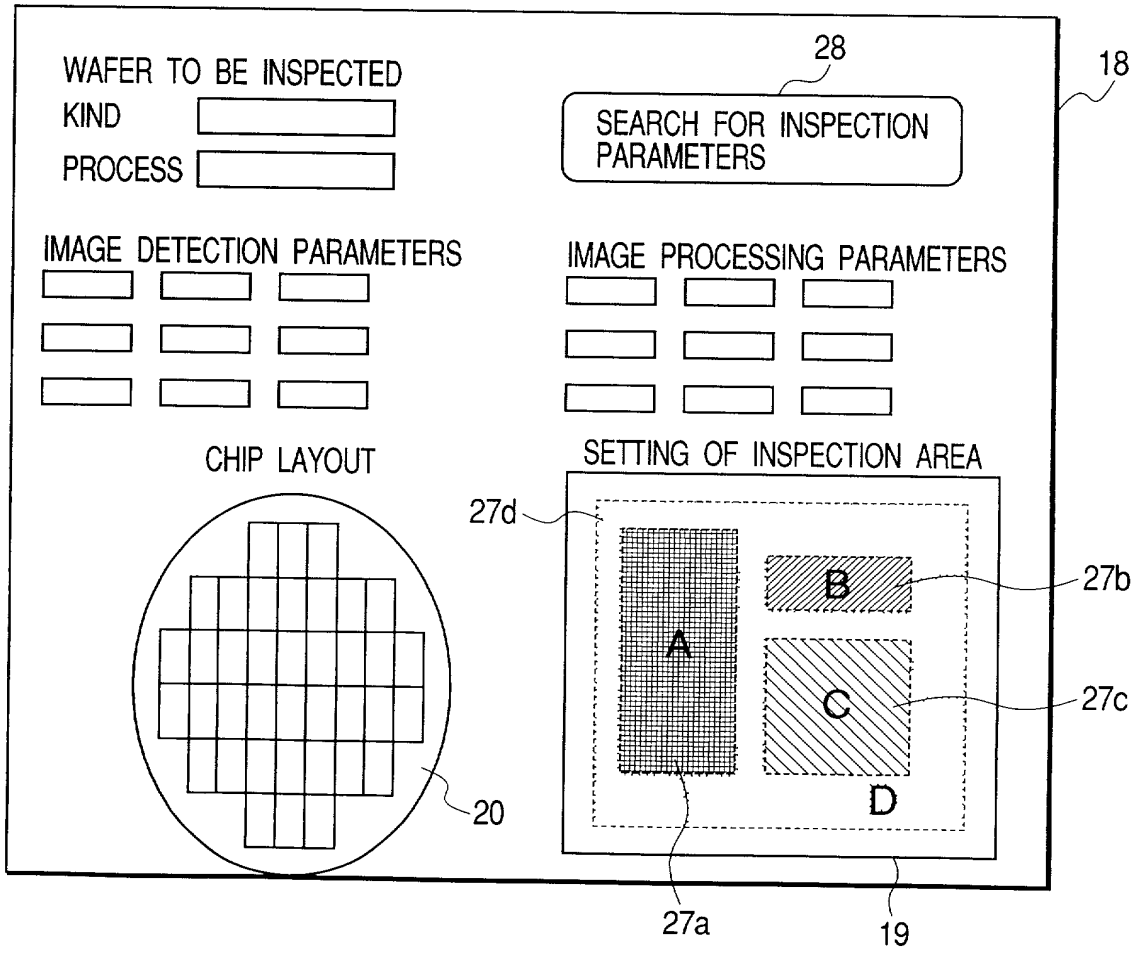

WAFER TO BE INSPECTED
KIND
PROCESS
28
SEARCH FOR INSPECTION PARAMETERS
18
IMAGE DETECTION PARAMETERS
IMAGE PROCESSING PARAMETERS
CHIP LAYOUT
SETTING OF INSPECTION AREA
27d
A
B
C
D
27b
27c
20
27a
19

FIG. 16

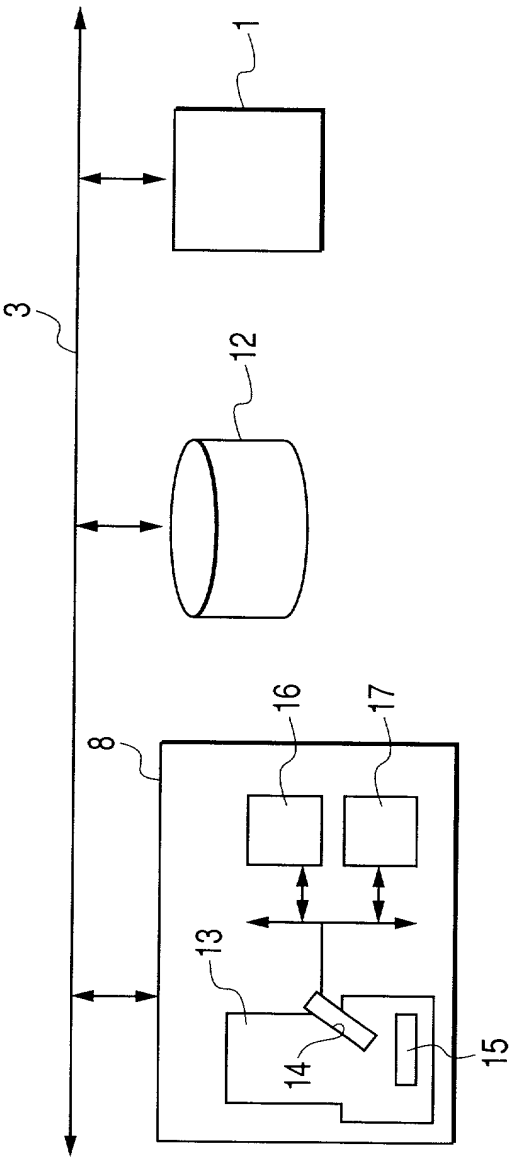


FIG. 17

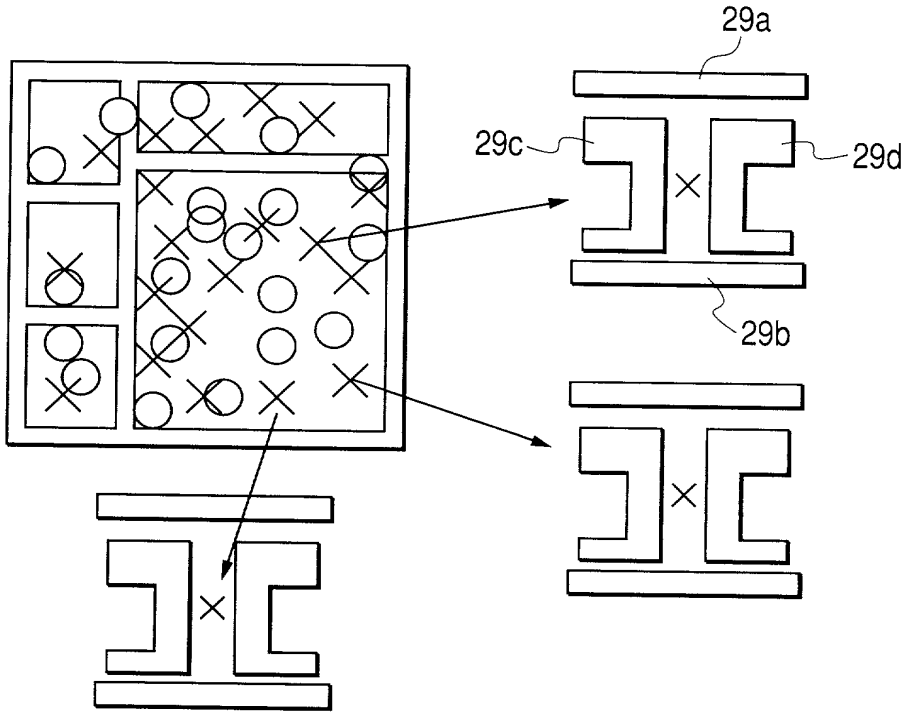

29a
29c
29d
29b

FIG. 18

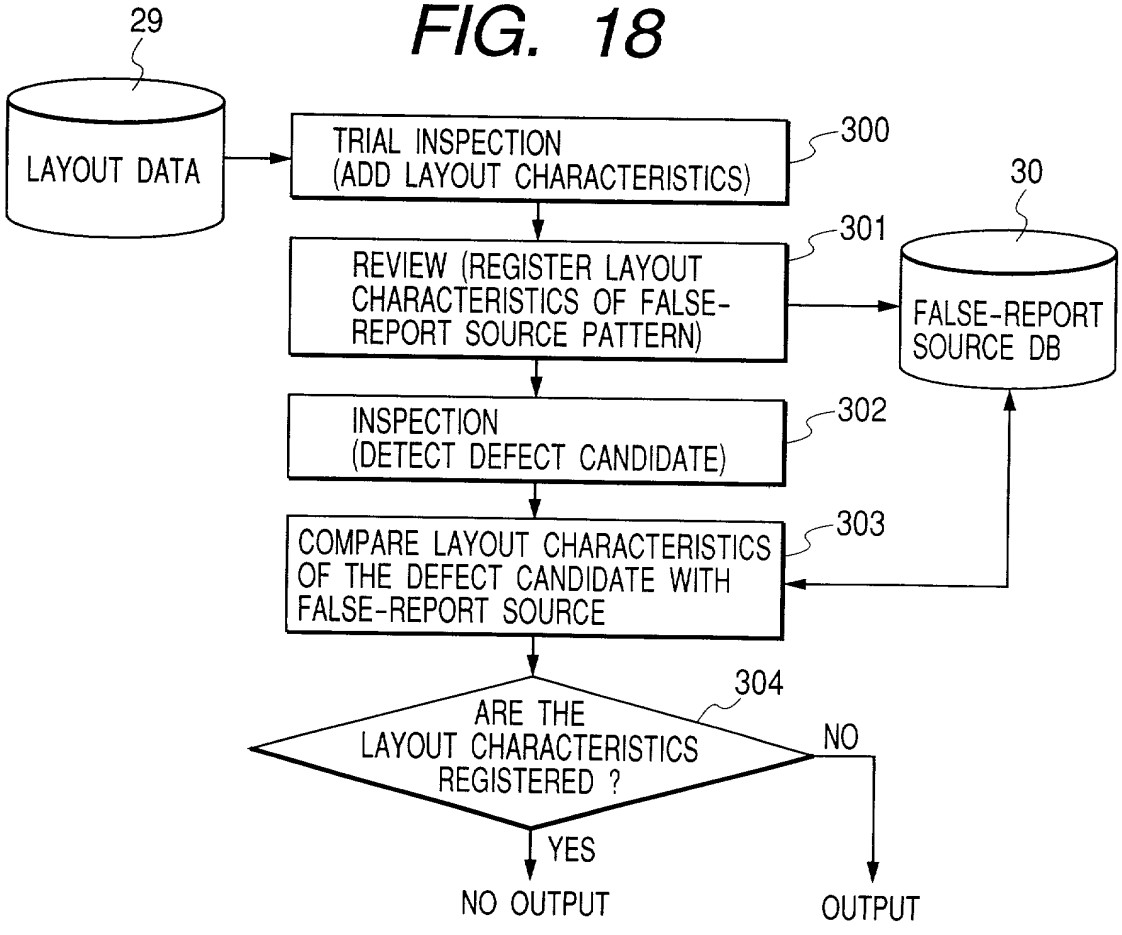

29
LAYOUT DATA
TRIAL INSPECTION (ADD LAYOUT CHARACTERISTICS)
300
30
301
REVIEW (REGISTER LAYOUT CHARACTERISTICS OF FALSE-REPORT SOURCE PATTERN)
FALSE-REPORT SOURCE DB
INSPECTION (DETECT DEFECT CANDIDATE)
302
COMPARE LAYOUT CHARACTERISTICS OF THE DEFECT CANDIDATE WITH FALSE-REPORT SOURCE
303
304
ARE THE LAYOUT CHARACTERISTICS REGISTERED ?
NO
YES
NO OUTPUT
OUTPUT

FIG. 19

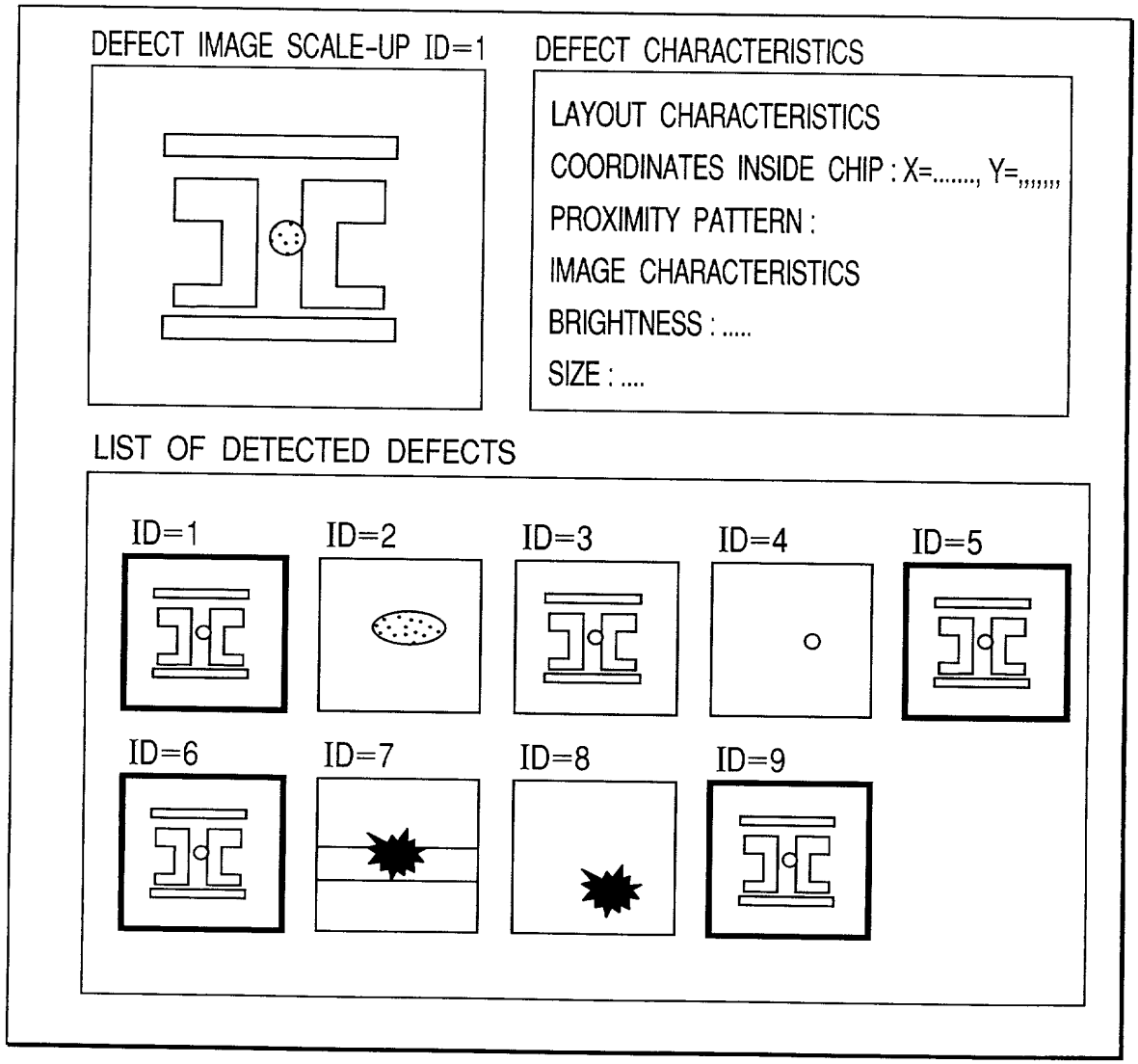

DEFECT IMAGE SCALE-UP ID=1
DEFECT CHARACTERISTICS
LAYOUT CHARACTERISTICS
COORDINATES INSIDE CHIP : X=....., Y=,,,,,,,
PROXIMITY PATTERN :
IMAGE CHARACTERISTICS
BRIGHTNESS : .....
SIZE : ....
LIST OF DETECTED DEFECTS
ID=1
ID=2
ID=3
ID=4
ID=5
ID=6
ID=7
ID=8
ID=9

FIG. 20

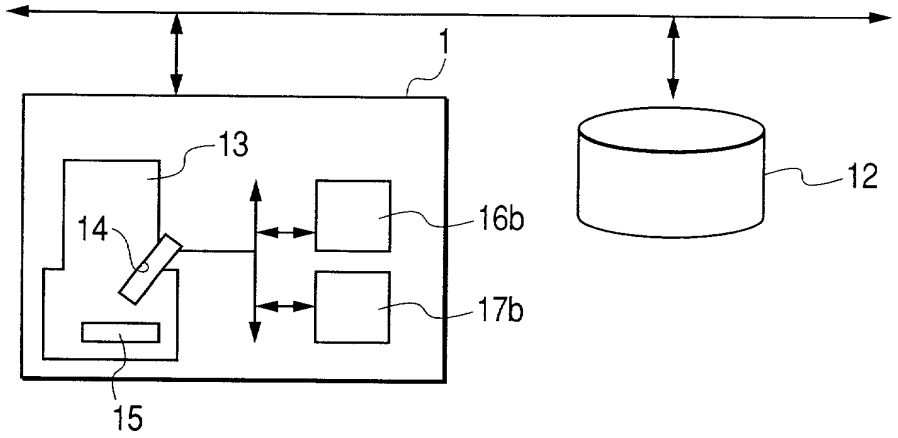

1
13
14
16b
17b
15
12

FIG. 21

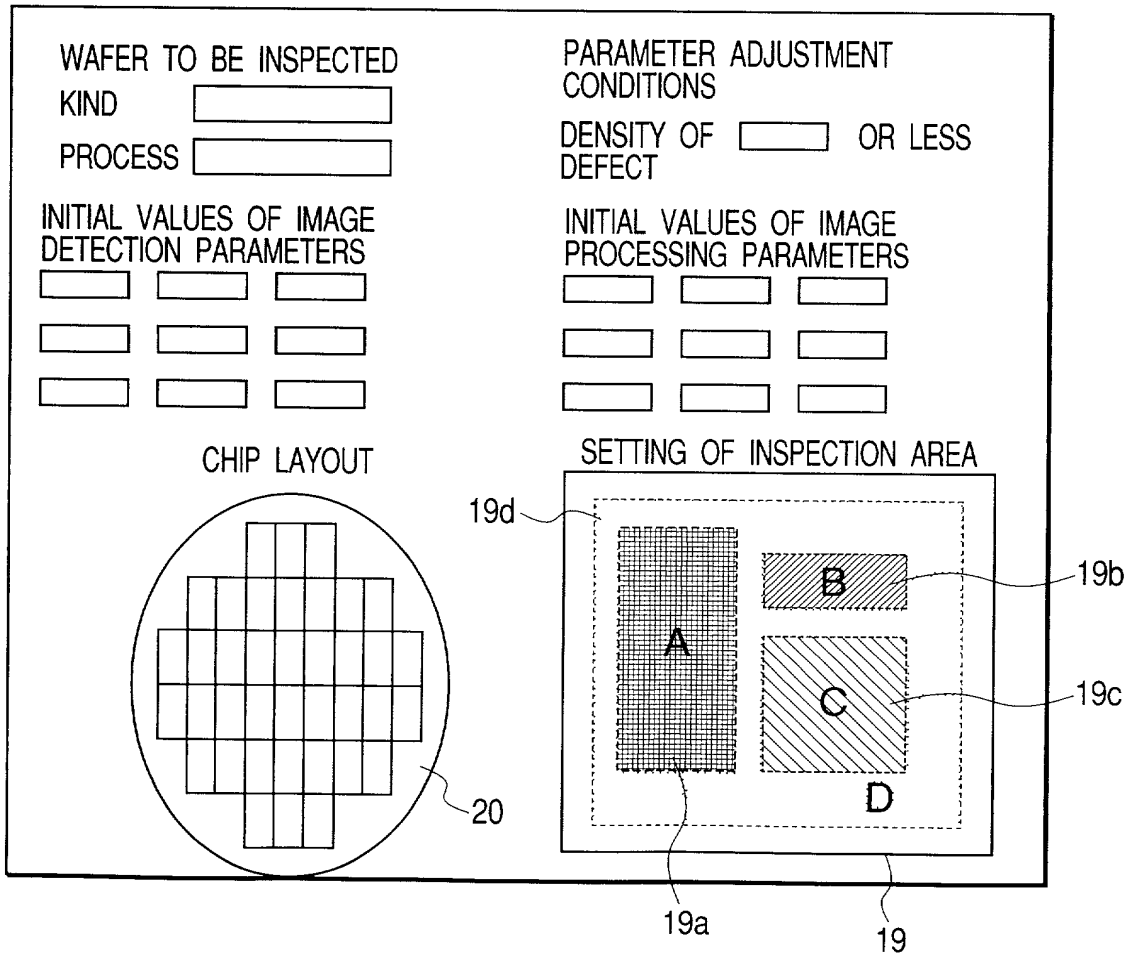

WAFER TO BE INSPECTED
KIND
PROCESS
PARAMETER ADJUSTMENT CONDITIONS
DENSITY OF
OR LESS
DEFECT
INITIAL VALUES OF IMAGE DETECTION PARAMETERS
INITIAL VALUES OF IMAGE PROCESSING PARAMETERS
CHIP LAYOUT
SETTING OF INSPECTION AREA
19d
19b
19c
A
B
C
D
20
19a
19

FIG. 22

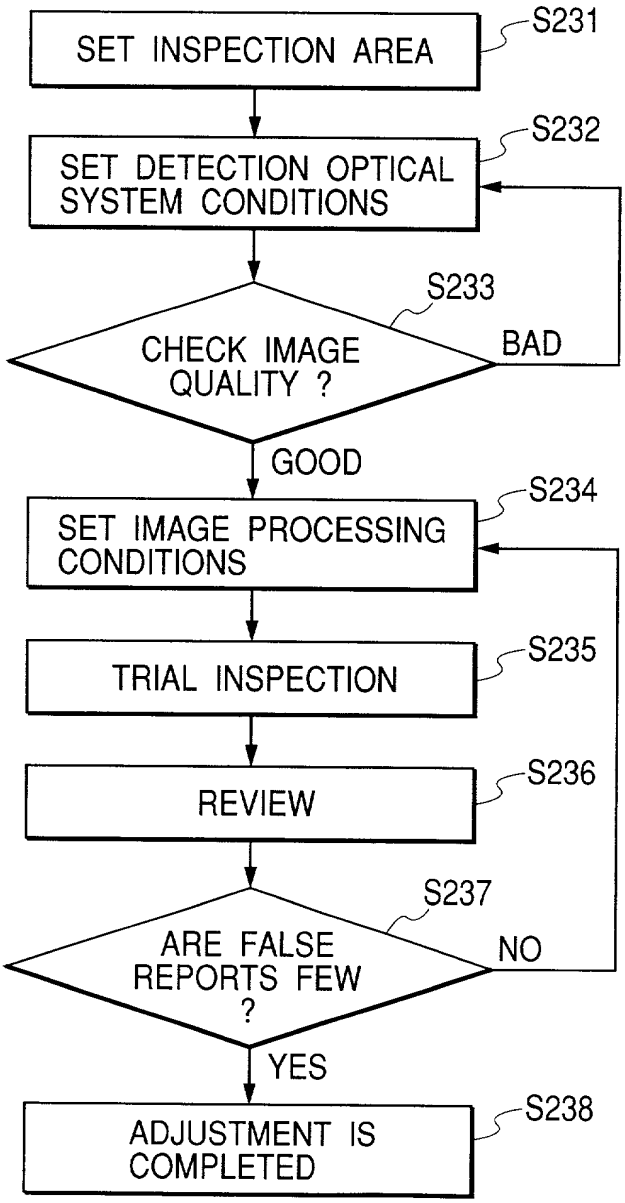

SET INSPECTION AREA
S231
SET DETECTION OPTICAL SYSTEM CONDITIONS
S232
CHECK IMAGE QUALITY ?
S233
BAD
GOOD
SET IMAGE PROCESSING CONDITIONS
S234
TRIAL INSPECTION
S235
REVIEW
S236
ARE FALSE REPORTS FEW ?
S237
NO
YES
ADJUSTMENT IS COMPLETED
S238

FIG. 23

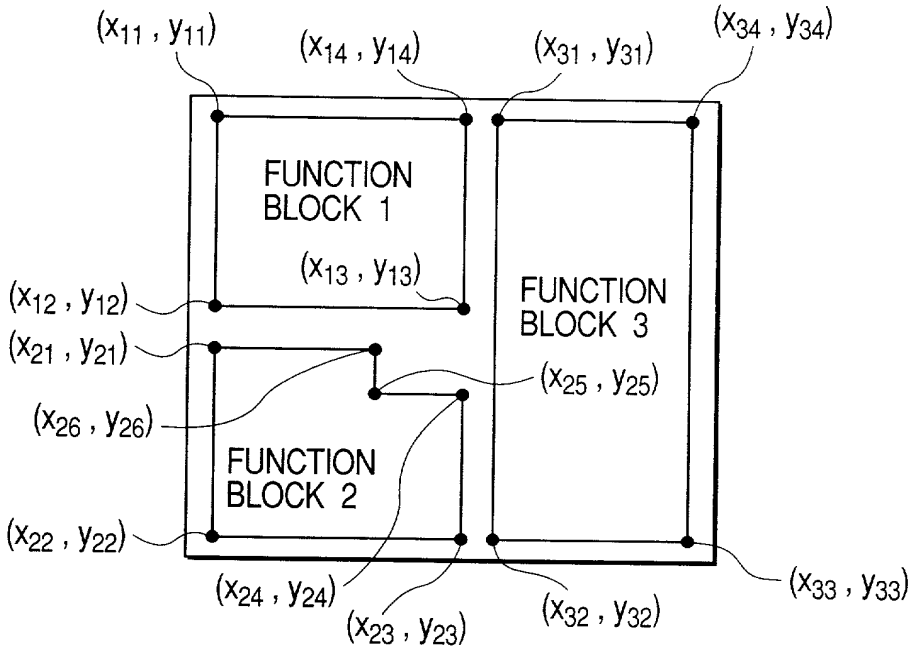

(x_{11}, y_{11})
(x_{14}, y_{14})
(x_{31}, y_{31})
(x_{34}, y_{34})
FUNCTION BLOCK 1
(x_{13}, y_{13})
FUNCTION BLOCK 3
(x_{12}, y_{12})
(x_{21}, y_{21})
(x_{25}, y_{25})
(x_{26}, y_{26})
FUNCTION BLOCK 2
(x_{22}, y_{22})
(x_{24}, y_{24})
(x_{23}, y_{23})
(x_{32}, y_{32})
(x_{33}, y_{33})

FIG. 24

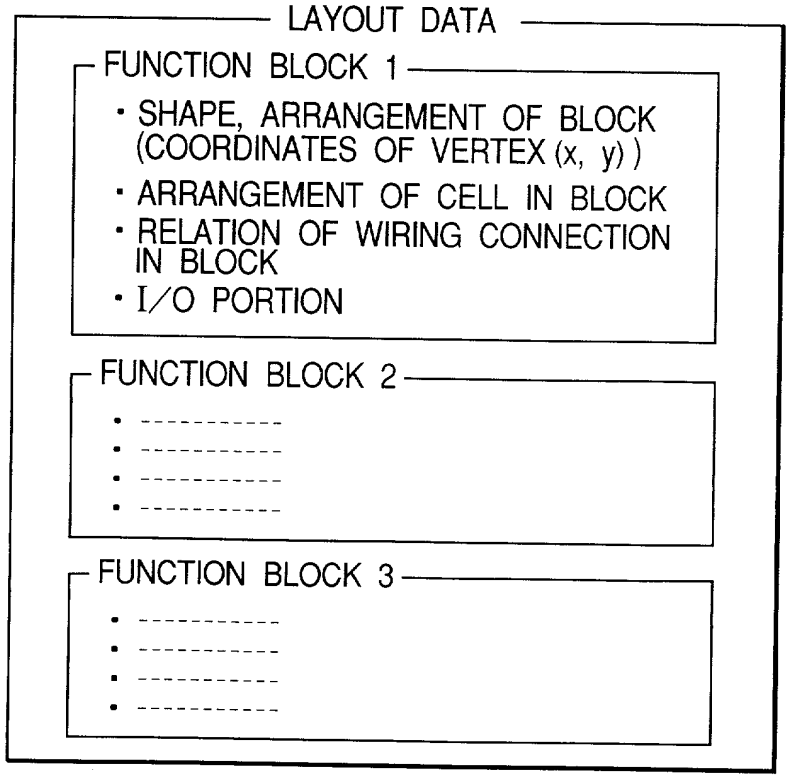

LAYOUT DATA
FUNCTION BLOCK 1
• SHAPE, ARRANGEMENT OF BLOCK (COORDINATES OF VERTEX (x, y))
• ARRANGEMENT OF CELL IN BLOCK
• RELATION OF WIRING CONNECTION IN BLOCK
• I/O PORTION
FUNCTION BLOCK 2
• ----------
• ----------
• ----------
• ----------
FUNCTION BLOCK 3
• ----------
• ----------
• ----------
• ----------

FIG. 25

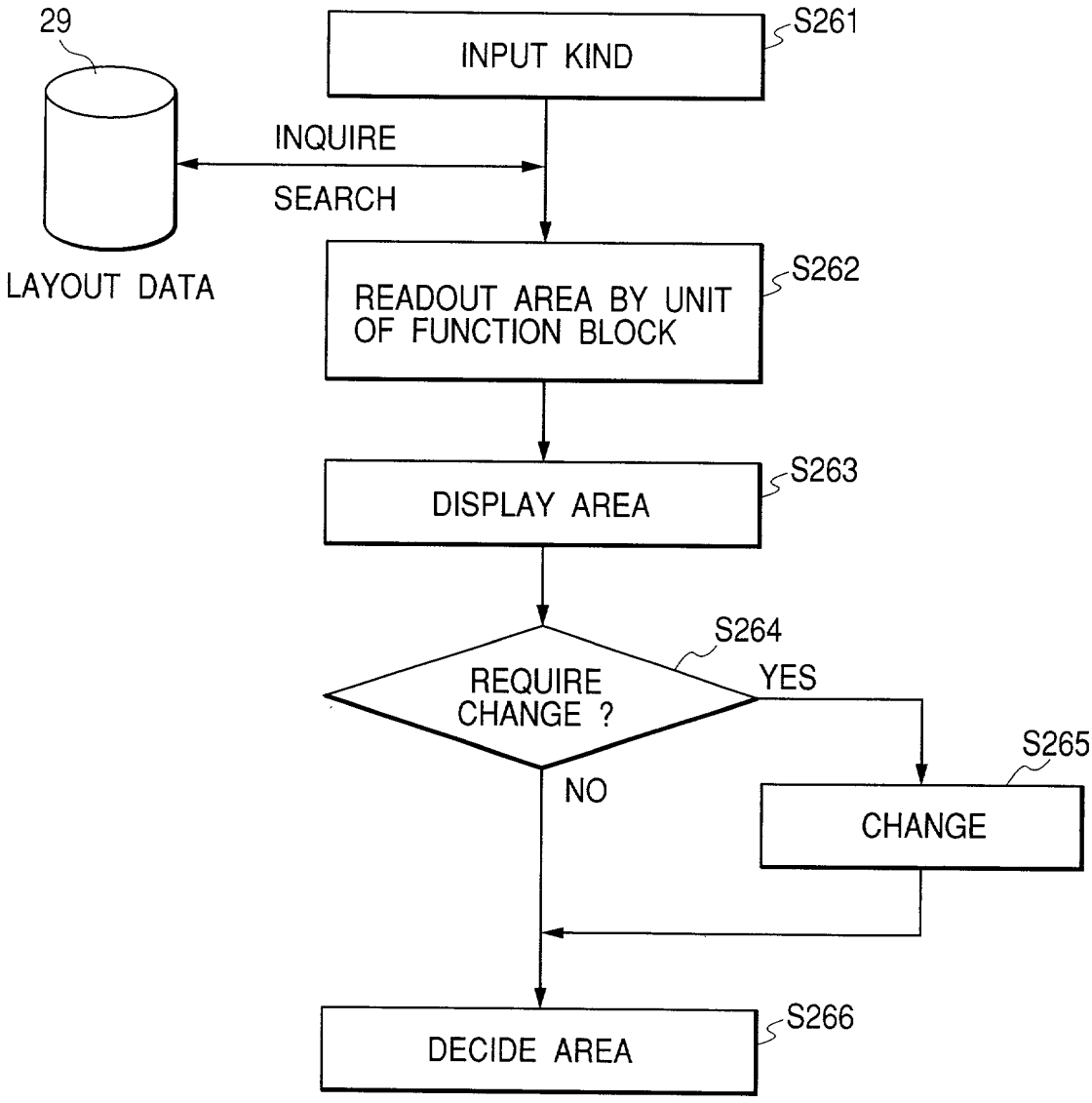

29
INPUT KIND
S261
INQUIRE
SEARCH
LAYOUT DATA
READOUT AREA BY UNIT OF FUNCTION BLOCK
S262
DISPLAY AREA
S263
S264
REQUIRE CHANGE ?
YES
NO
S265
CHANGE
DECIDE AREA
S266

FIG. 26

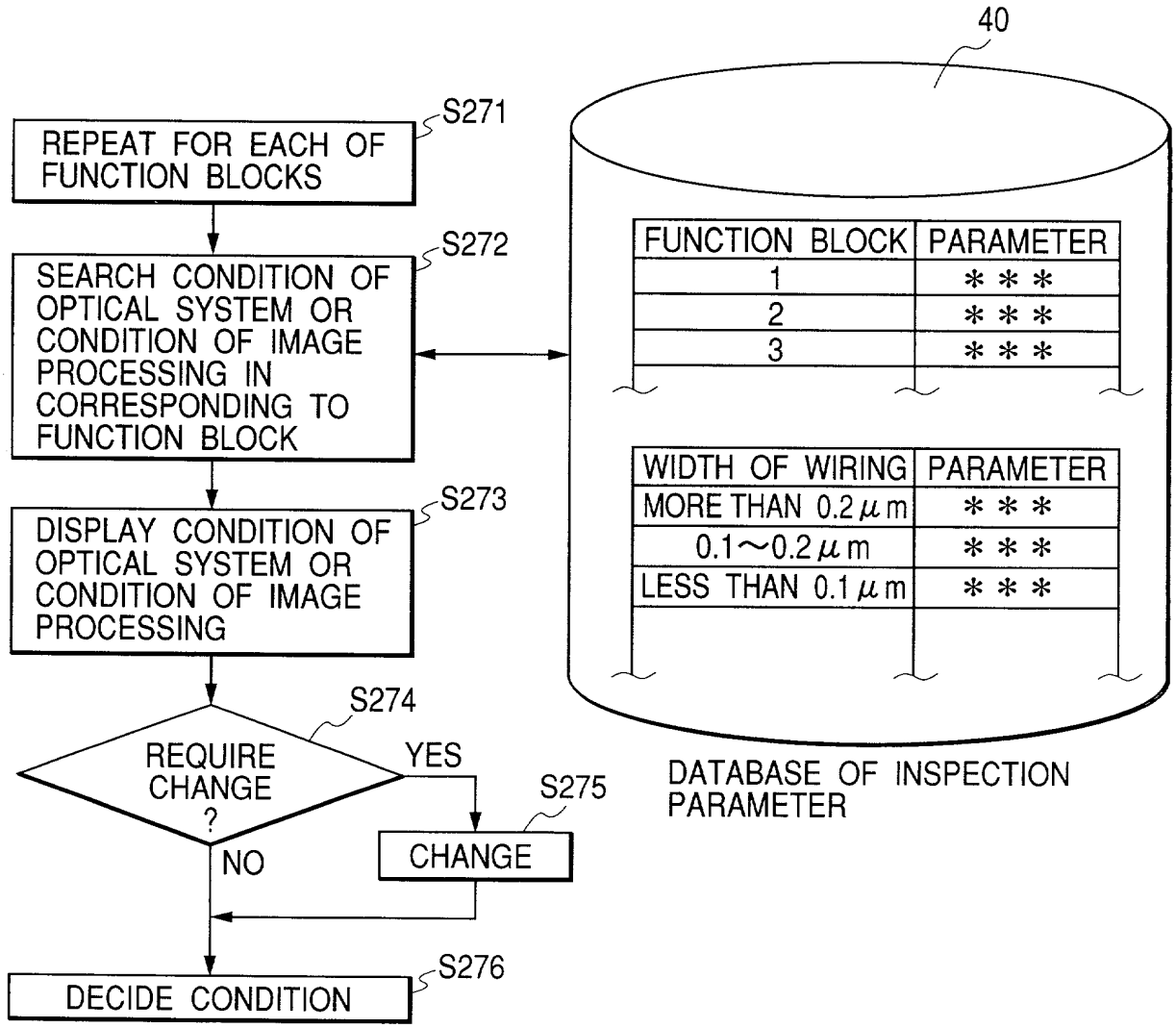

40
S271
REPEAT FOR EACH OF FUNCTION BLOCKS
S272
SEARCH CONDITION OF OPTICAL SYSTEM OR CONDITION OF IMAGE PROCESSING IN CORRESPONDING TO FUNCTION BLOCK
S273
DISPLAY CONDITION OF OPTICAL SYSTEM OR CONDITION OF IMAGE PROCESSING
S274
REQUIRE CHANGE ?
YES
NO
S275
CHANGE
S276
DECIDE CONDITION
FUNCTION BLOCK
PARAMETER
1
2
3
* * *
WIDTH OF WIRING
PARAMETER
MORE THAN 0.2 μm
0.1～0.2 μm
LESS THAN 0.1 μm
DATABASE OF INSPECTION PARAMETER

FIG. 27

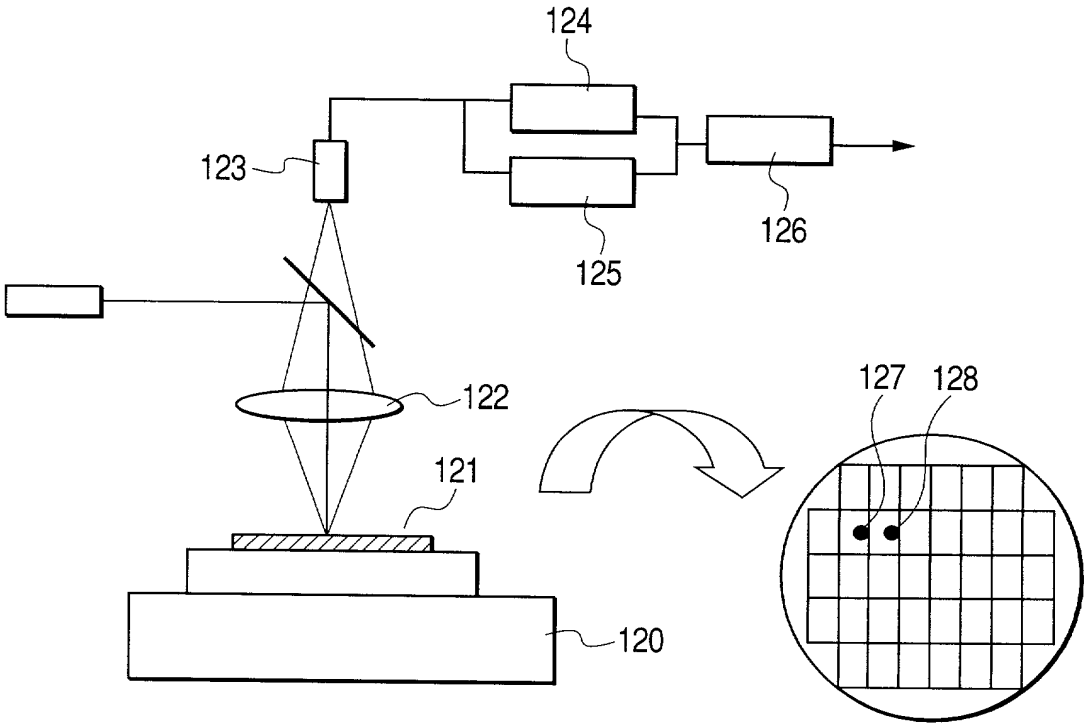


FIG. 28

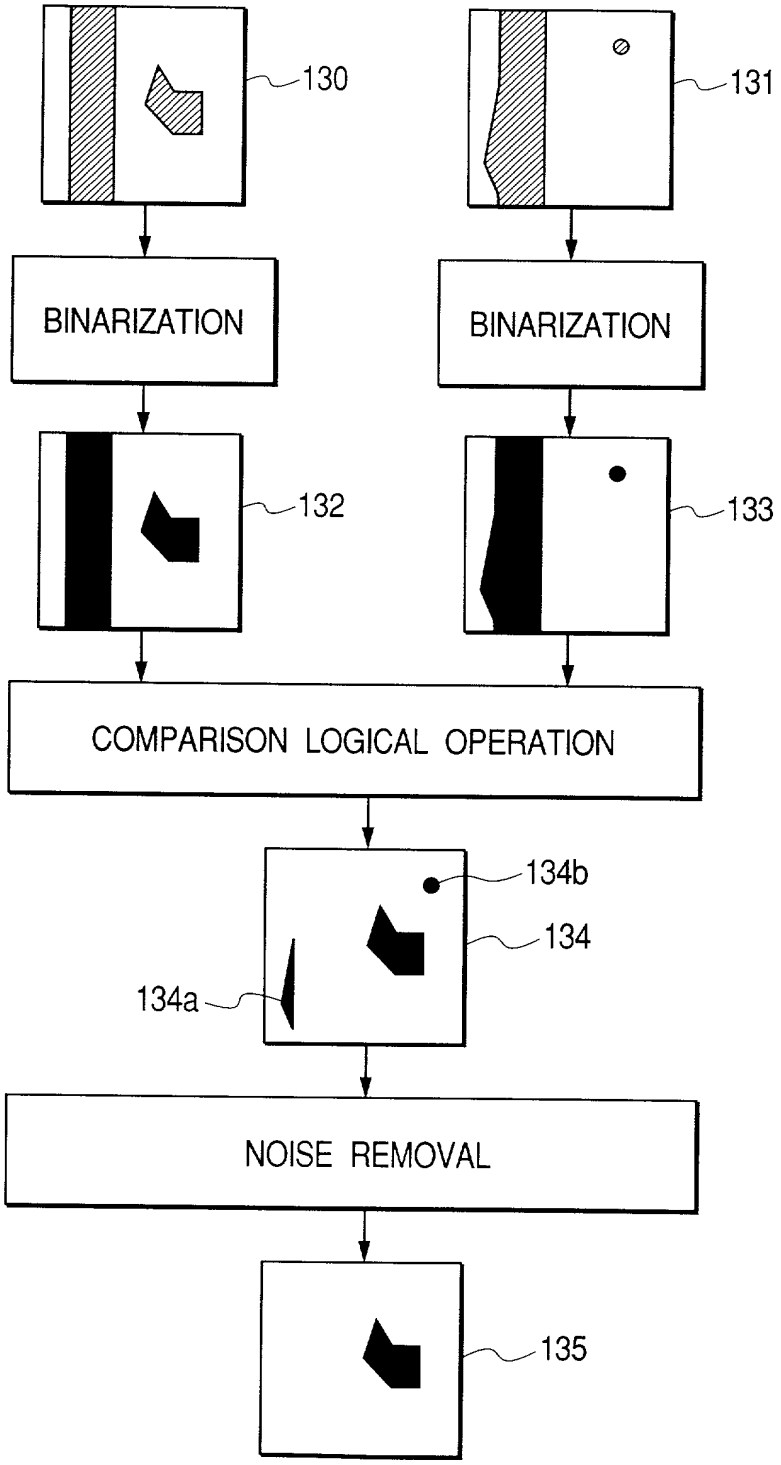
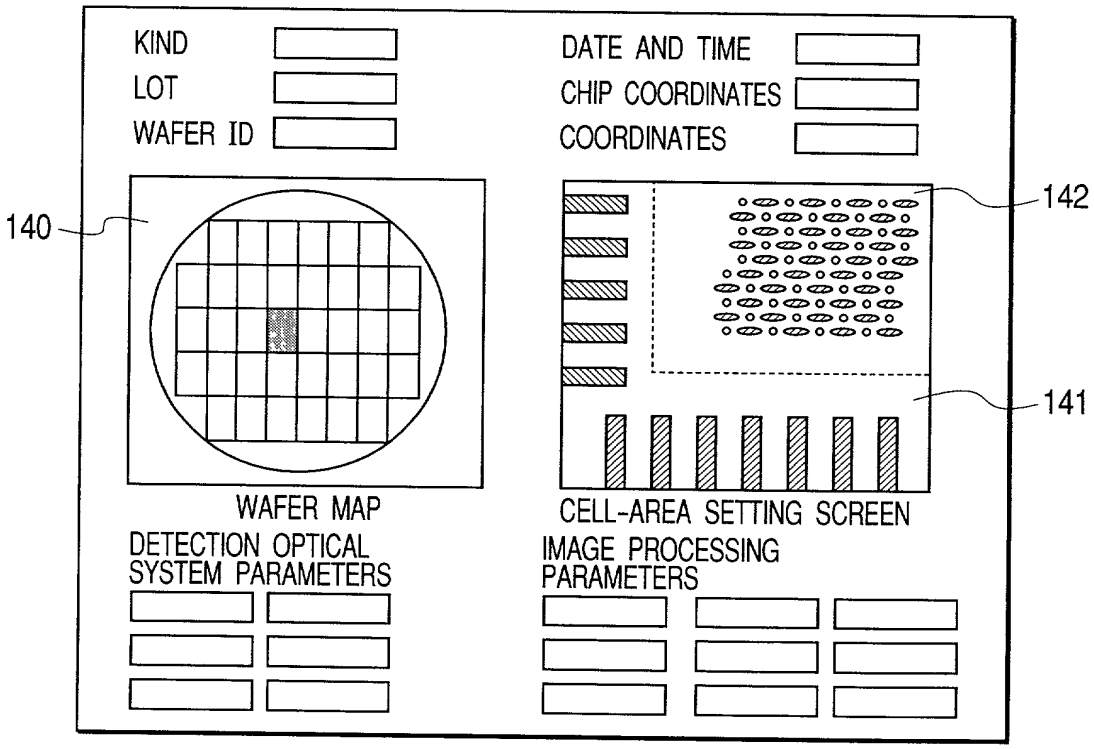

130
131
BINARIZATION
BINARIZATION
132
133
COMPARISON LOGICAL OPERATION
134b
134
134a
NOISE REMOVAL
135

FIG. 29


KIND
LOT
WAFER ID
DATE AND TIME
CHIP COORDINATES
COORDINATES
140
142
141
WAFER MAP
CELL-AREA SETTING SCREEN
DETECTION OPTICAL SYSTEM PARAMETERS
IMAGE PROCESSING PARAMETERS